

THE REPUBLIC OF KOREA

THE STUDY  
ON  
RIVER ENVIRONMENT IMPROVEMENT  
FOR  
THE TRIBUTARIES OF HAN RIVER SYSTEM  
IN  
SEOUL MUNICIPALITY AND ITS VICINITY

VOLUME 1  
SUMMARY REPORT

JANUARY 1992

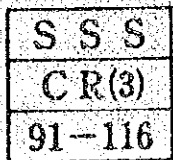
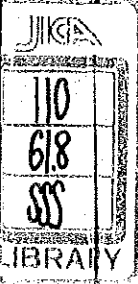
JAPAN INTERNATIONAL COOPERATION AGENCY

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FINAL REPORT

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JAPAN INTERNATIONAL COOPERATION AGENCY

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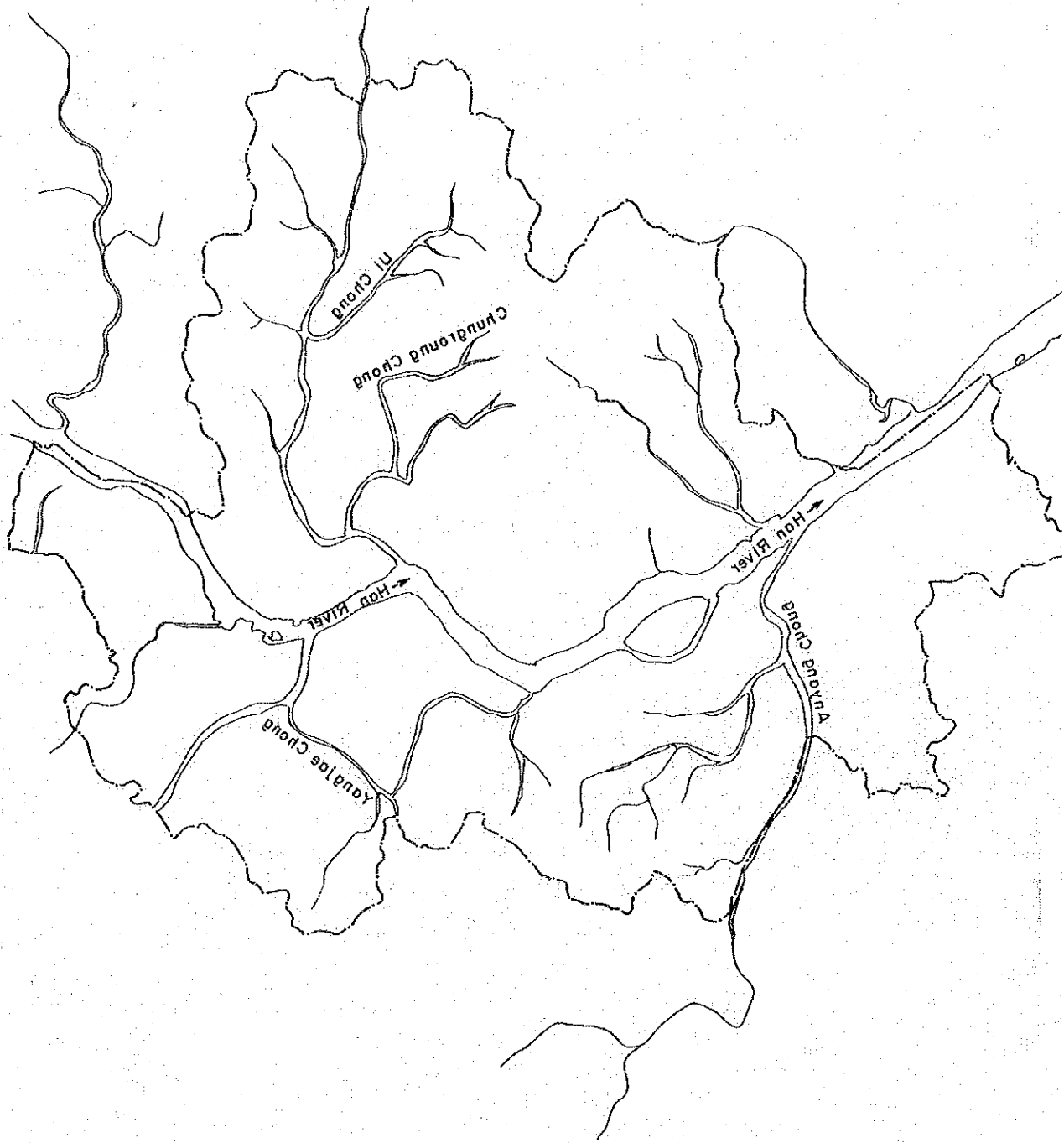
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# Location of River Environment Improvement Project



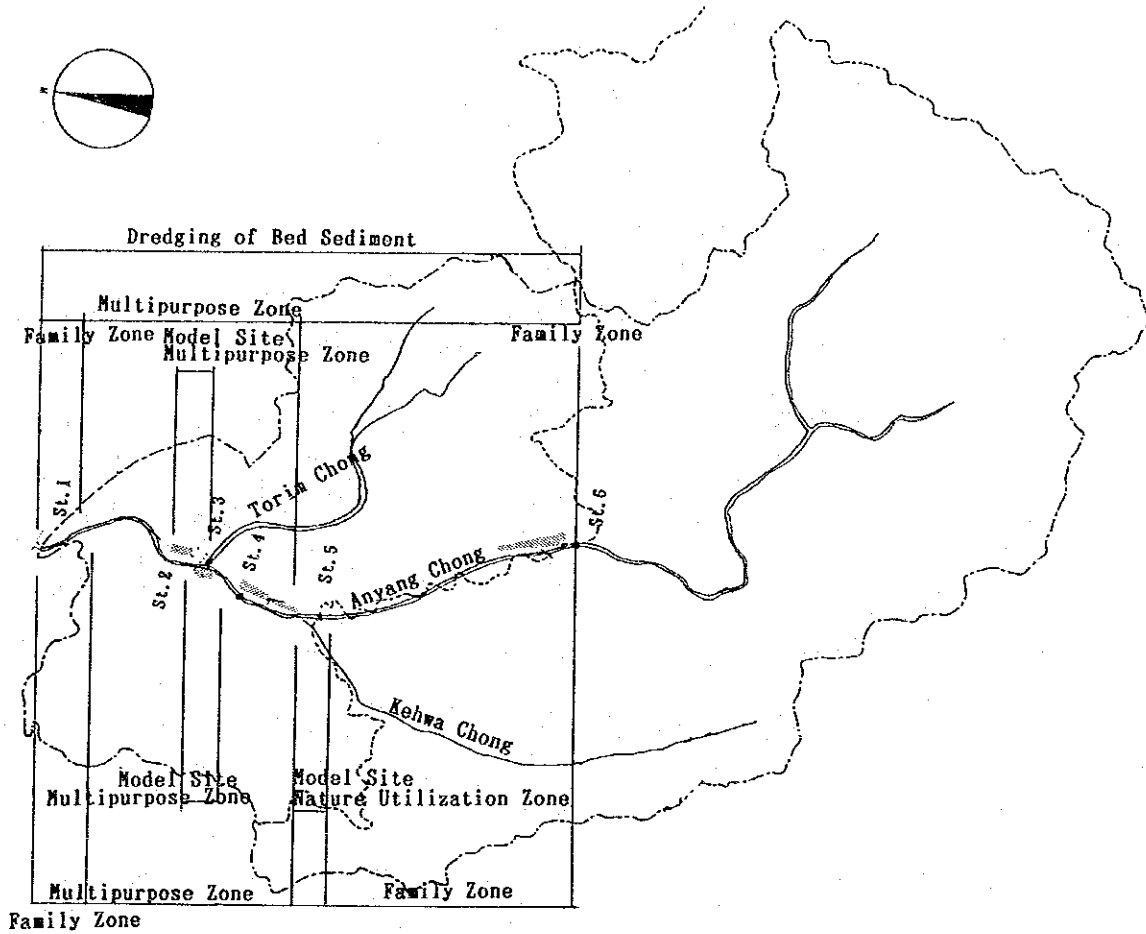


# Location of River Environment Improvement Project





# River Environment Improvement Plan Anyang Chong



▨ River Water Treatment Facility



Proposed Sites for River Water Treatment Facilities

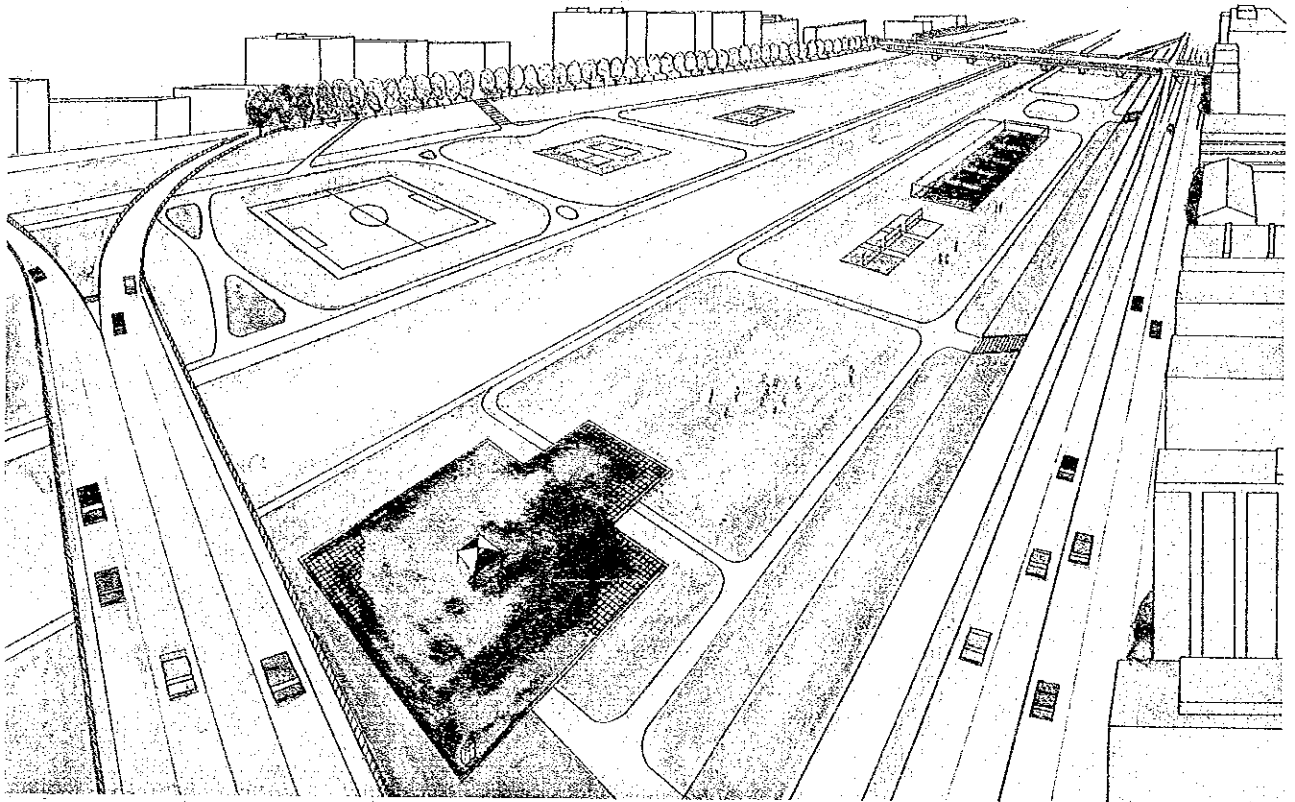


Image of River Space Improvement of Anyang Chong M1



Present View of Anyang Chon M1 Site

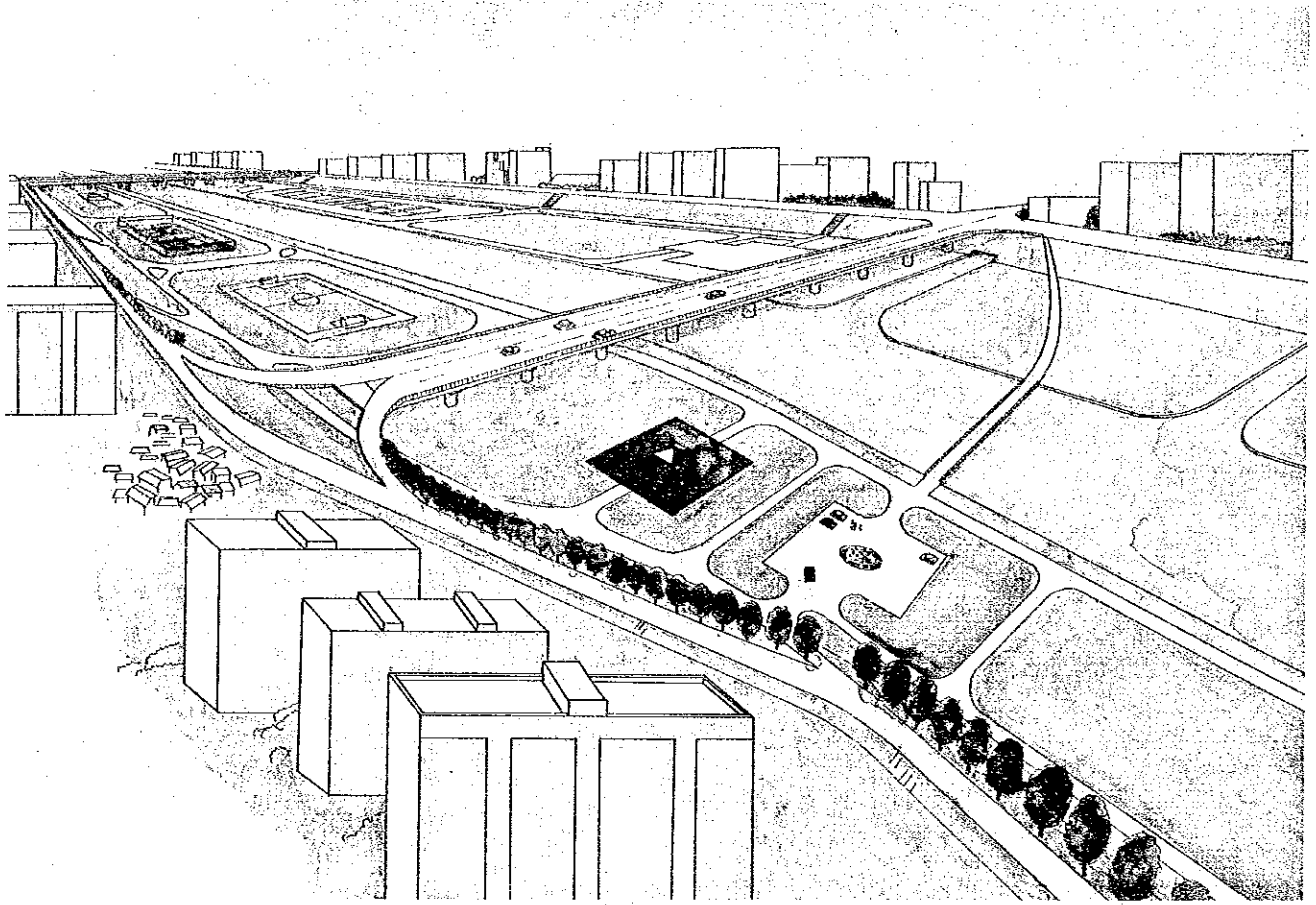
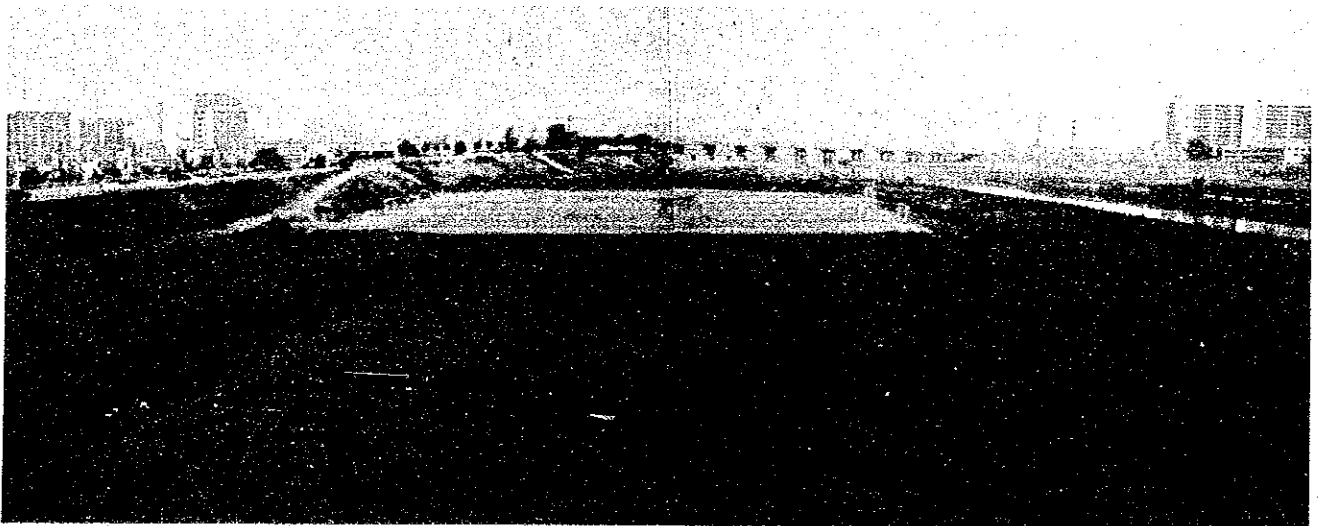


Image of River Space Improvement of Anyang Chong M2



Present View of Anyang Chong M2 Site

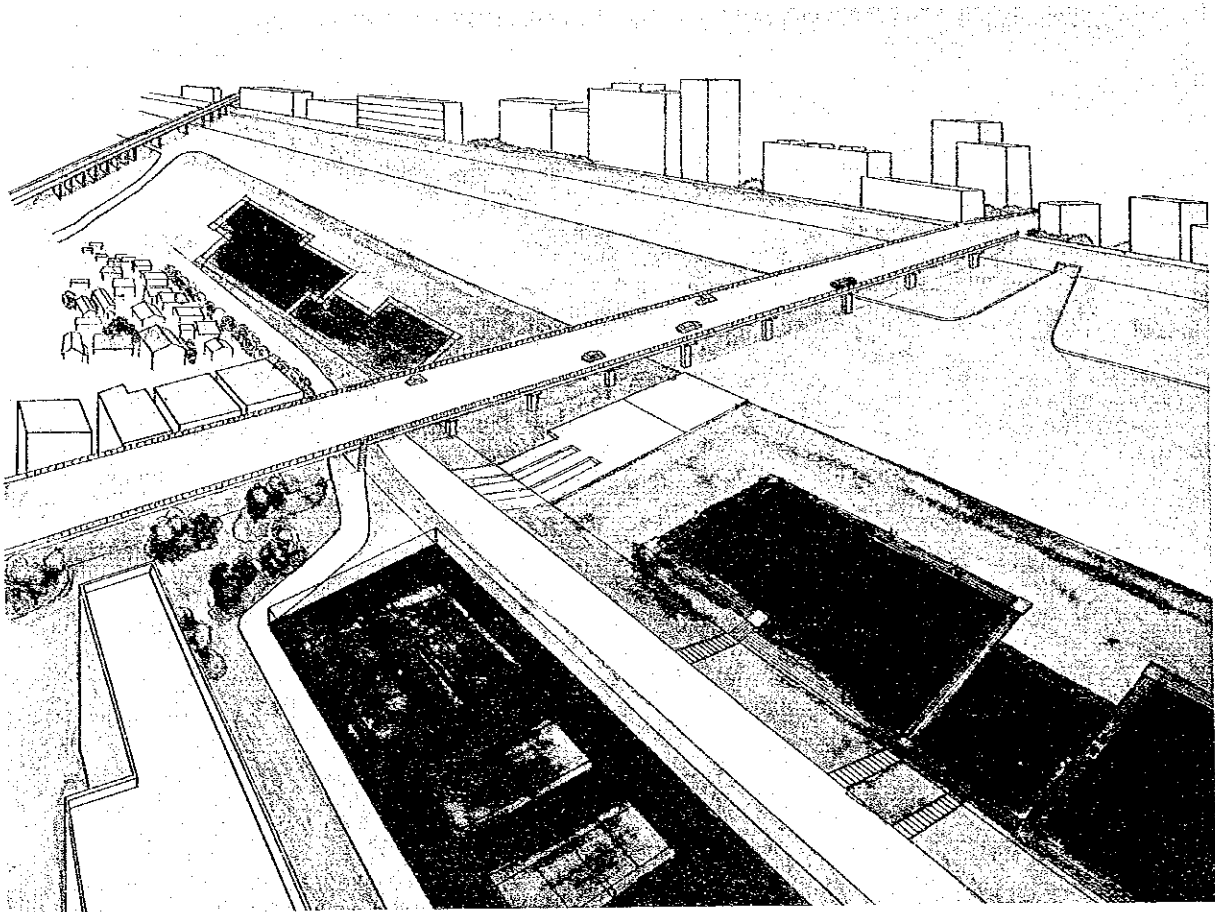
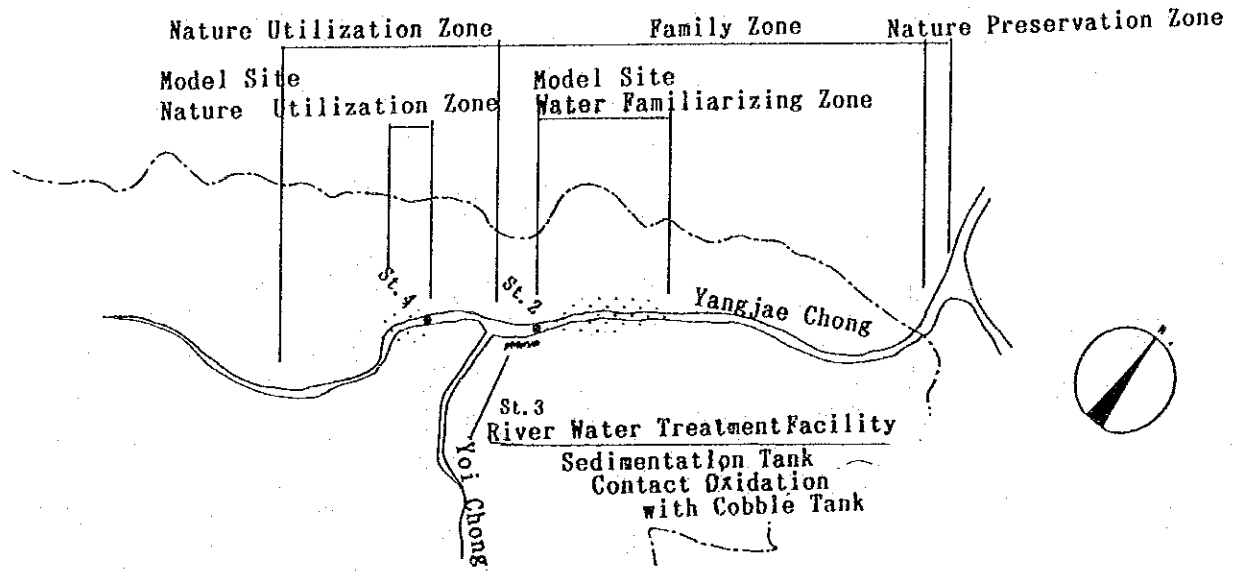


Image of River Space Improvement of Anyang Chong M3



Present View of Anyang Chong M3 Site

# River Environment Improvement Plan Yangjae Chong



Proposed Site for River Water Treatment Facility

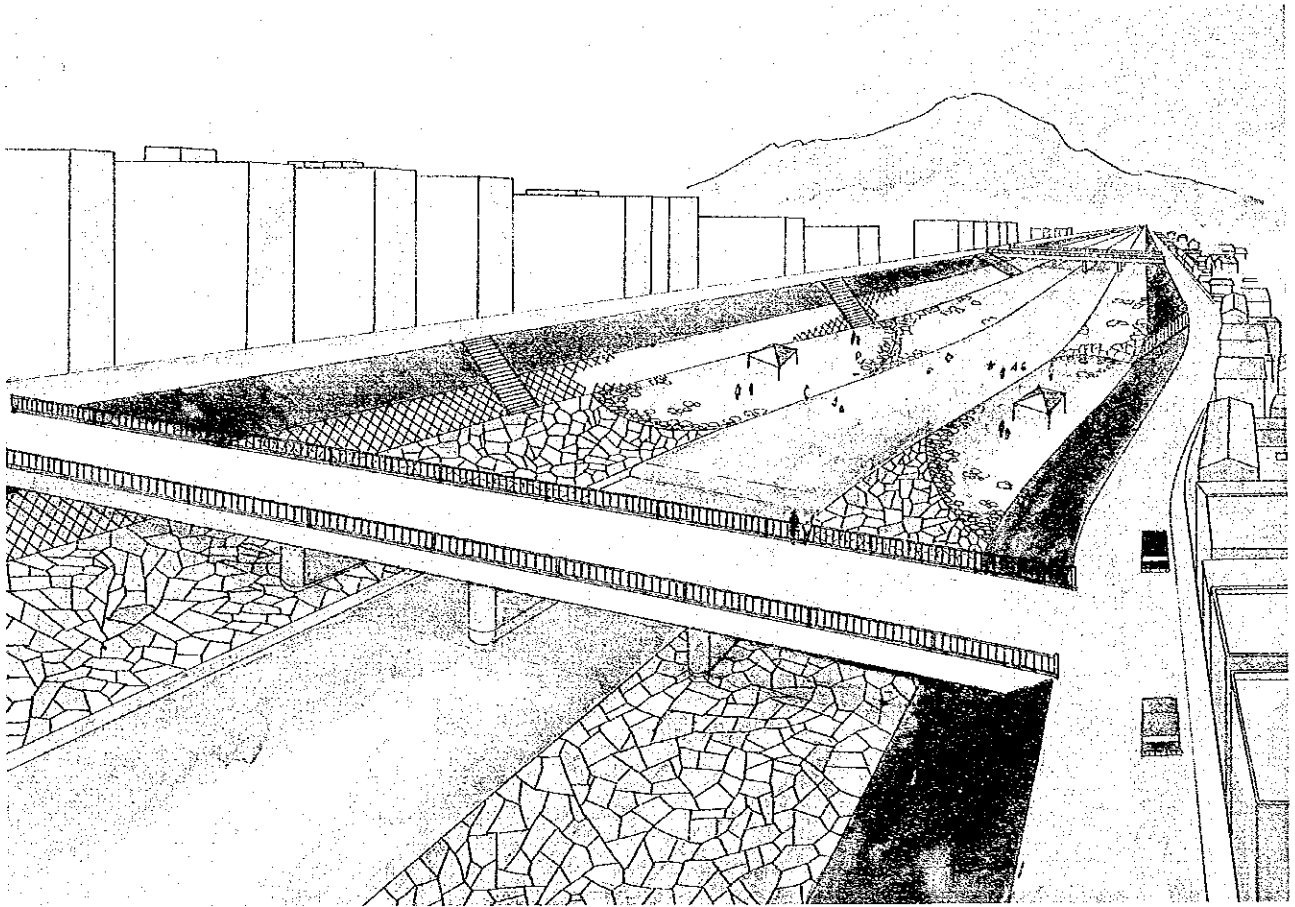
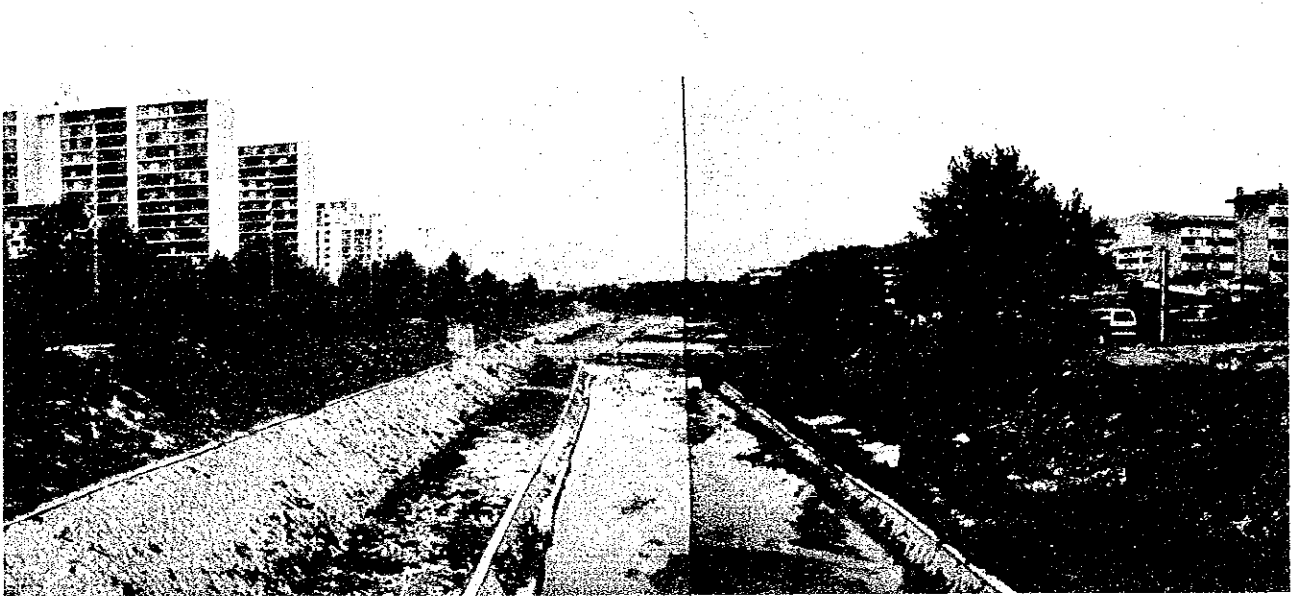


Image of River Space Improvement of Yangjae Chong MI



Present View of Yangjae Chong MI Site



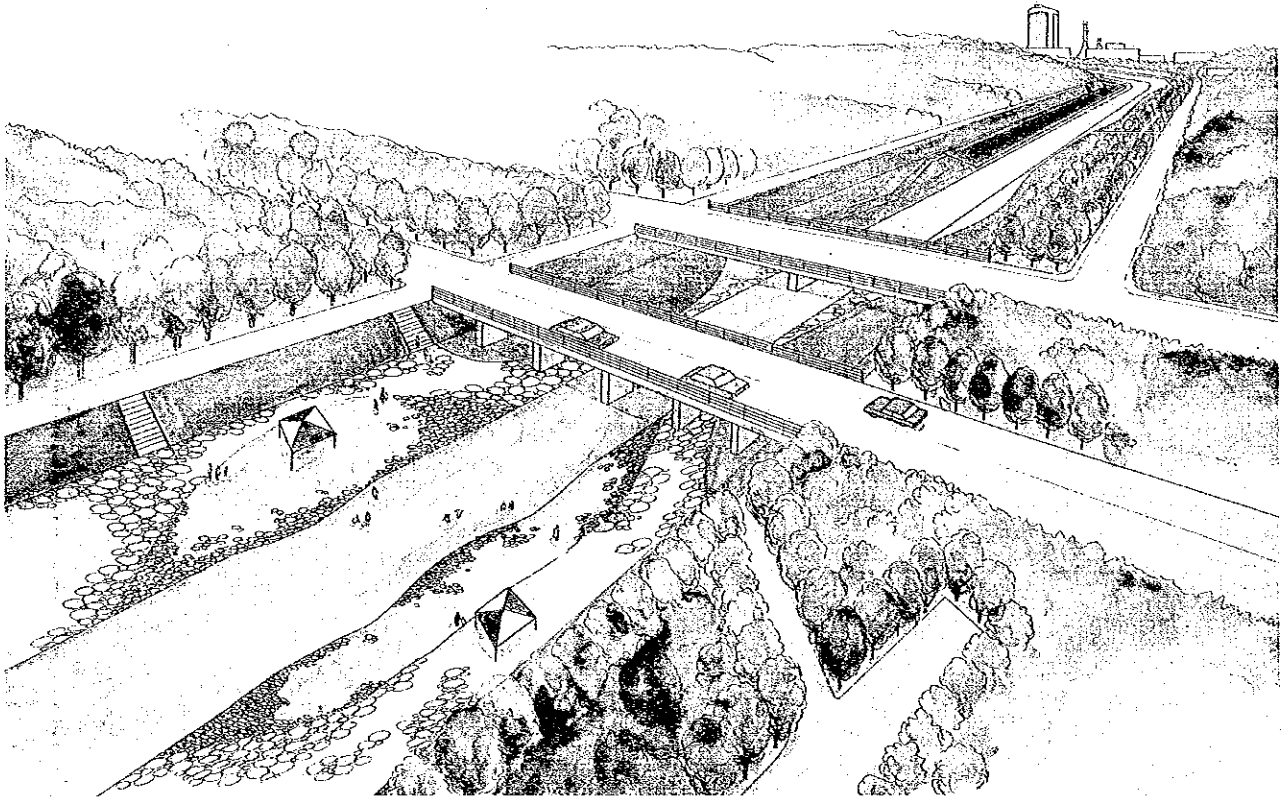
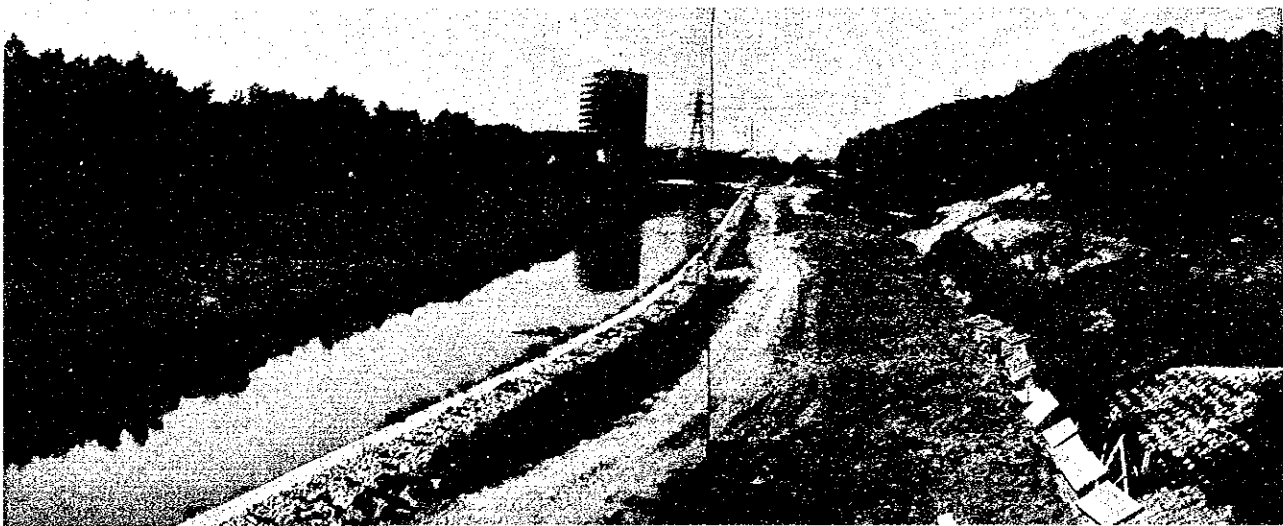


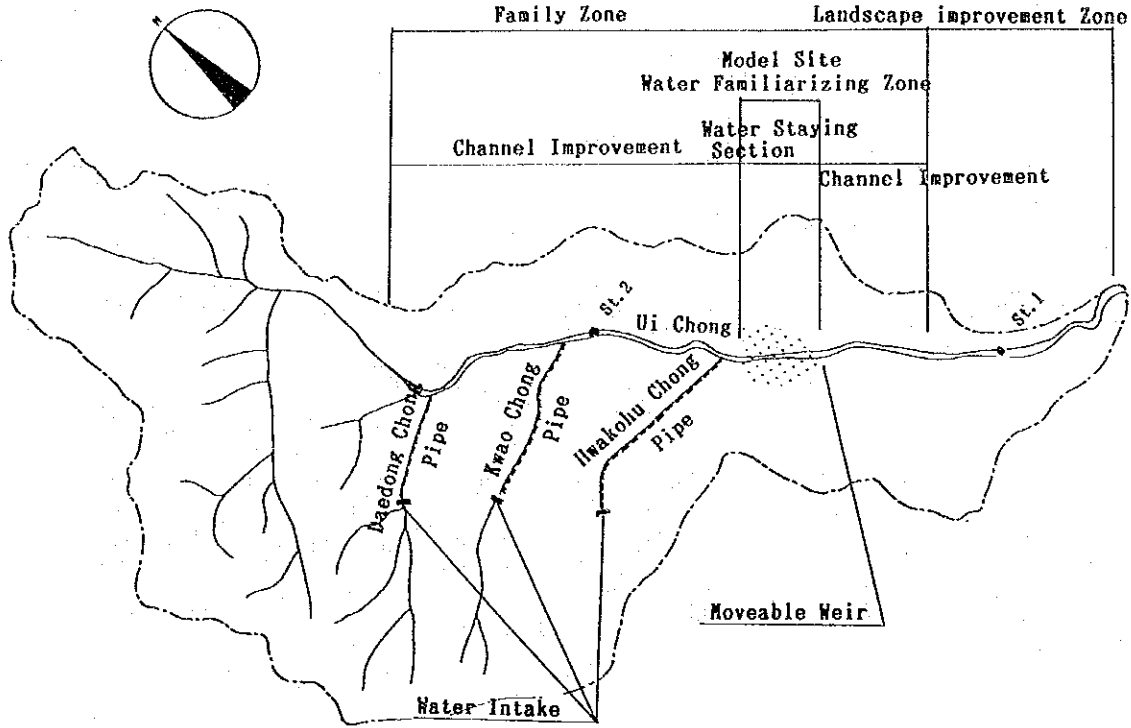
Image of River Space Improvement of Yangjae Chong M2



Present View of Yangjae Chong M2 Site



# River Environment Improvement Plan Ui Chong



Proposed Site of Water Intake in Kwao Chong



Proposed Site of Moveable Weir in Ui Chong

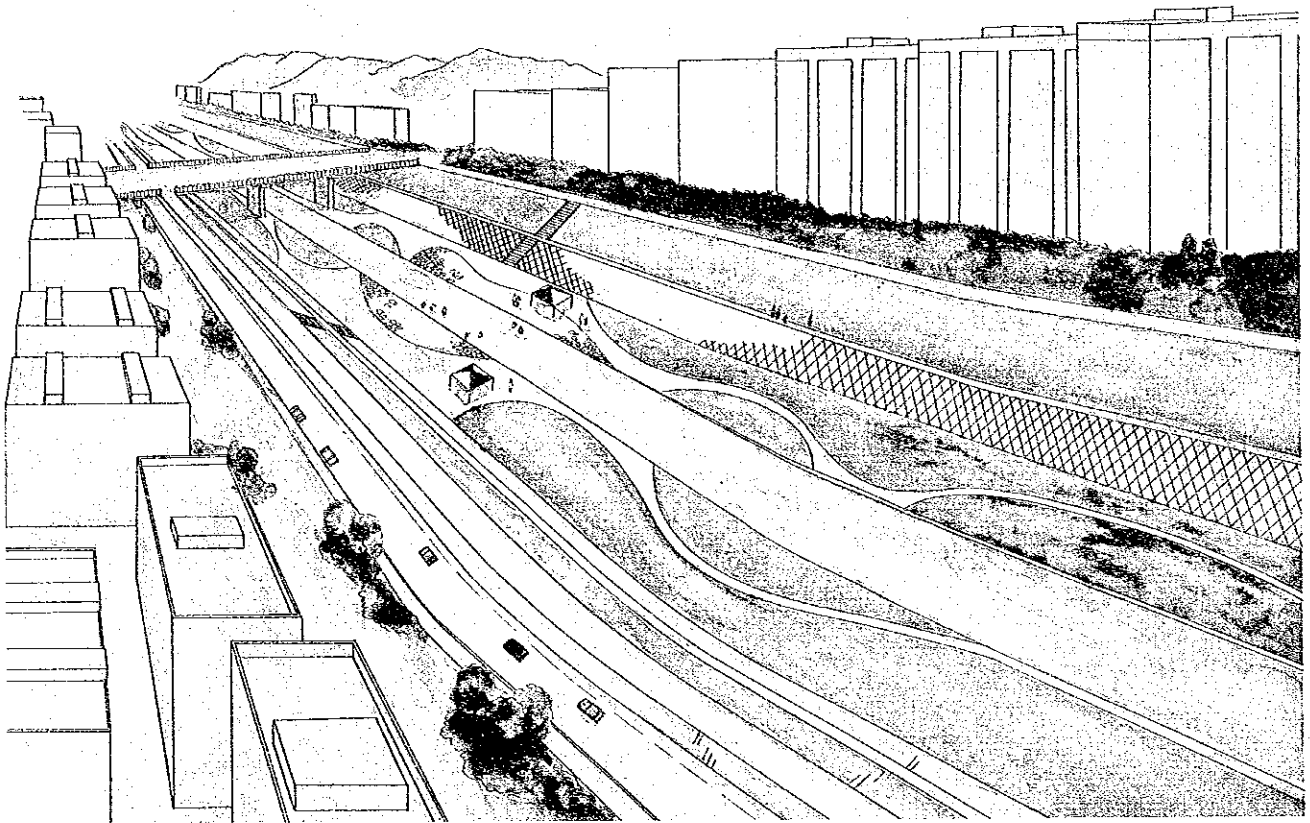
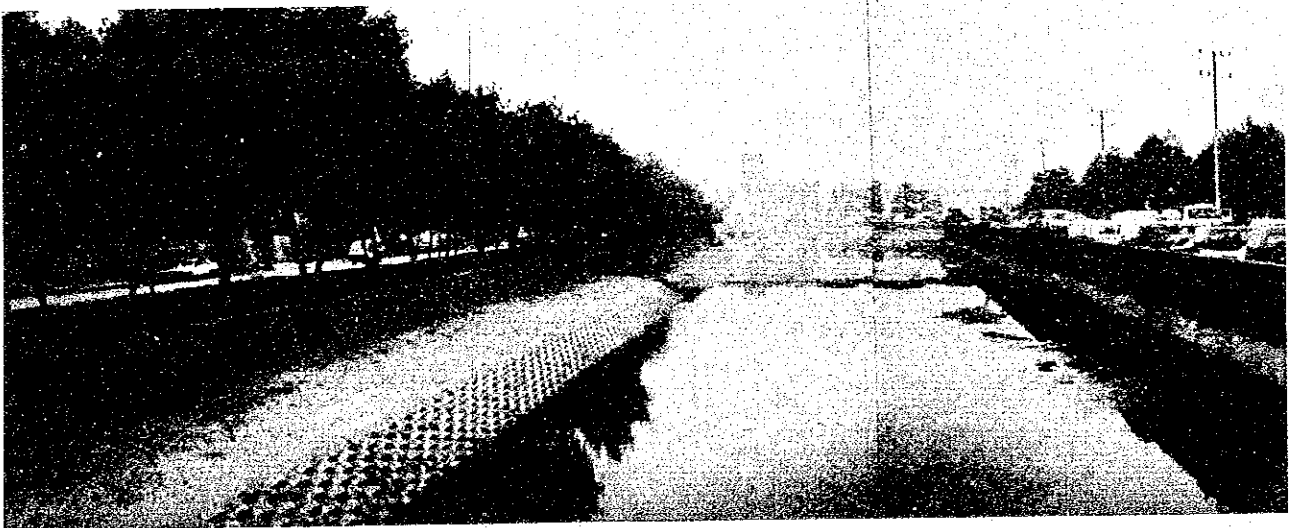
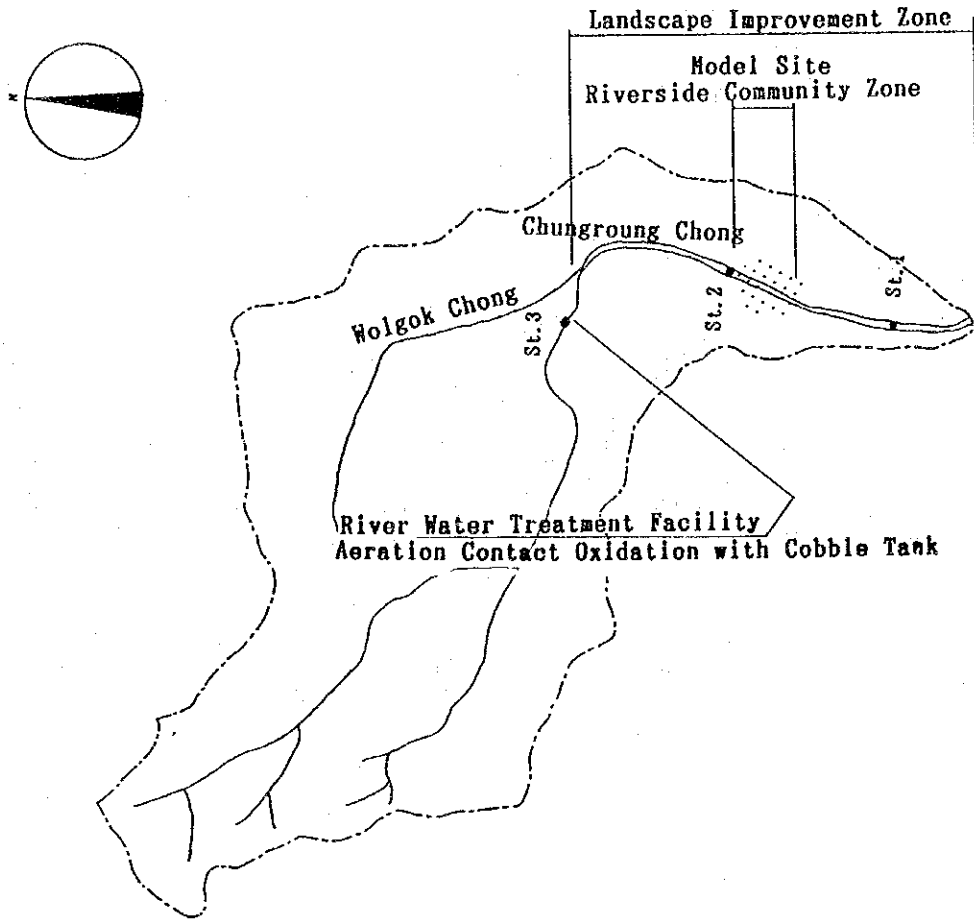


Image of River Space Improvement of Ui Chong M1



Present View of Ui Chong M1 Site

# River Environment Improvement Plan Chungroung Chong



Proposed Site for River Water Treatment Facility

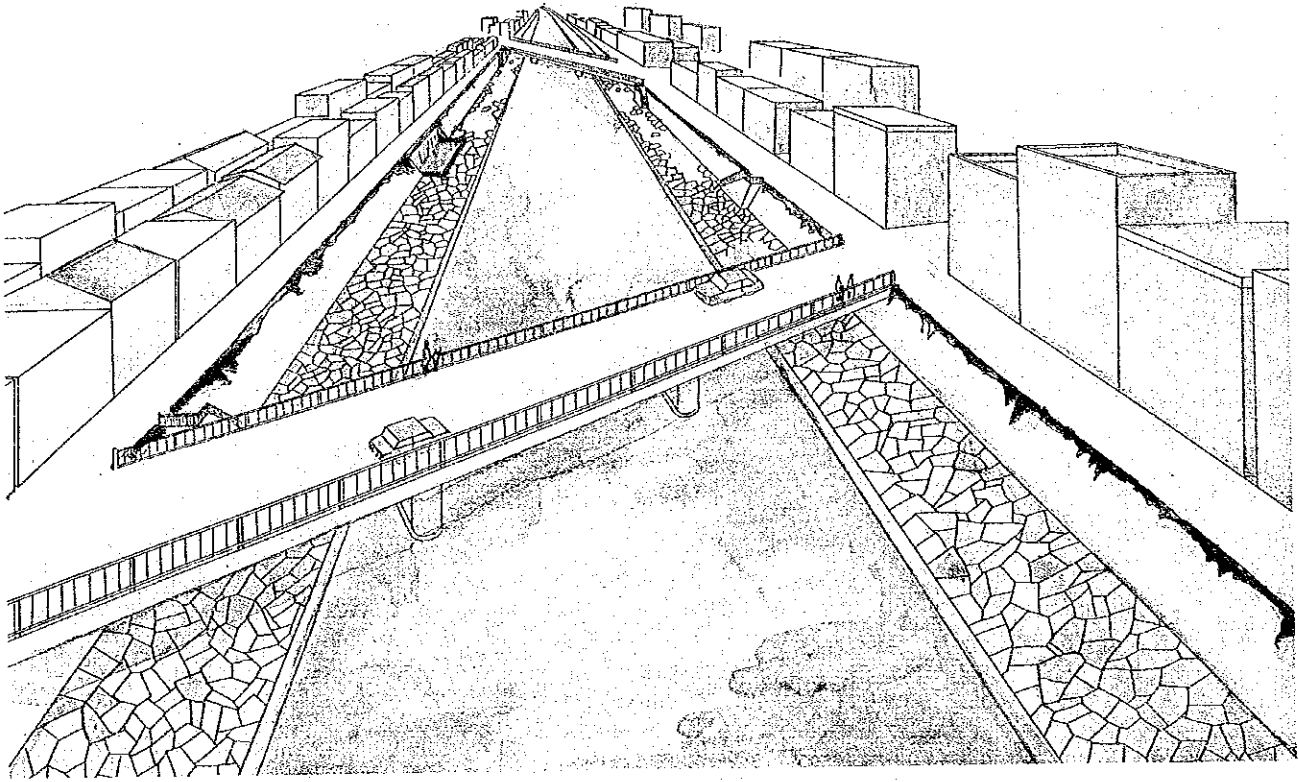


Image of River Space Improvement of Chungroung Chong M1



Present View of Chungroung Chong M1 Site



## Chapter 1 Outline of the Study

### 1.1 Objective of the Study

The Han River flowing in Seoul Metropolitan, the capital of the Republic of Korea (ROK), is the largest river in the country and has been playing an important role in the development of ROK as various water sources and a means of water transportation. Additionally, she has given favors to the inhabitants living along the river and supported the growth of the culture and spirit of the people.

The Integrated Han River Development Project, carried out from 1982 to 1987 by the Seoul Metropolitan Government, has remarkably improved flood control, water utilization, water quality and river space. Furthermore, it has developed the Han River as the citizens' important place of recreation and relaxation.

The tributaries of the Han River System in the Seoul Metropolitan, however, have only been maintained and improved minimally, and as a result, suffer from serious water pollution and flow decrease, and have become sources of bad smell and dumping grounds. In order to make these rivers affluent and to achieve a river environment similar to that of the Han River, the citizens of the Seoul Metropolitan demanded the improvement of these rivers.

This study has been carried out with such demand of the citizens of the Seoul Metropolitan as a background on the four middle- and small-scale rivers flowing through Seoul Metropolitan area with the purpose of establishing a basic river environment improvement plan composed of a water quality improvement plan executable as a river improvement work, flow regime improvement plan aiming at the recovery and utilization of the function which makes inhabitants intimate with river water, and a river space utilization plan to be made to satisfy the utilization demand and in accordance with the suitability of the rivers.



## **1.2 Study Area**

The study conducted an investigation on Anyang Chong (Chong: Korean word meaning "river"), Yangjae Chong, Ui Chong and Chungroung Chong (see Fig. 1.1-1). Among the four rivers, only Ui Chong and Chungroung Chong are completely included within the Seoul Metropolitan area. Anyang and Yangjae Chong are partially included in other municipal areas. The environment improvement plan of the study was prepared only for the Seoul Metropolitan area.

## **1.3 Study Flow Chart**

The flow chart of the study is shown in Fig. 1.3-1.





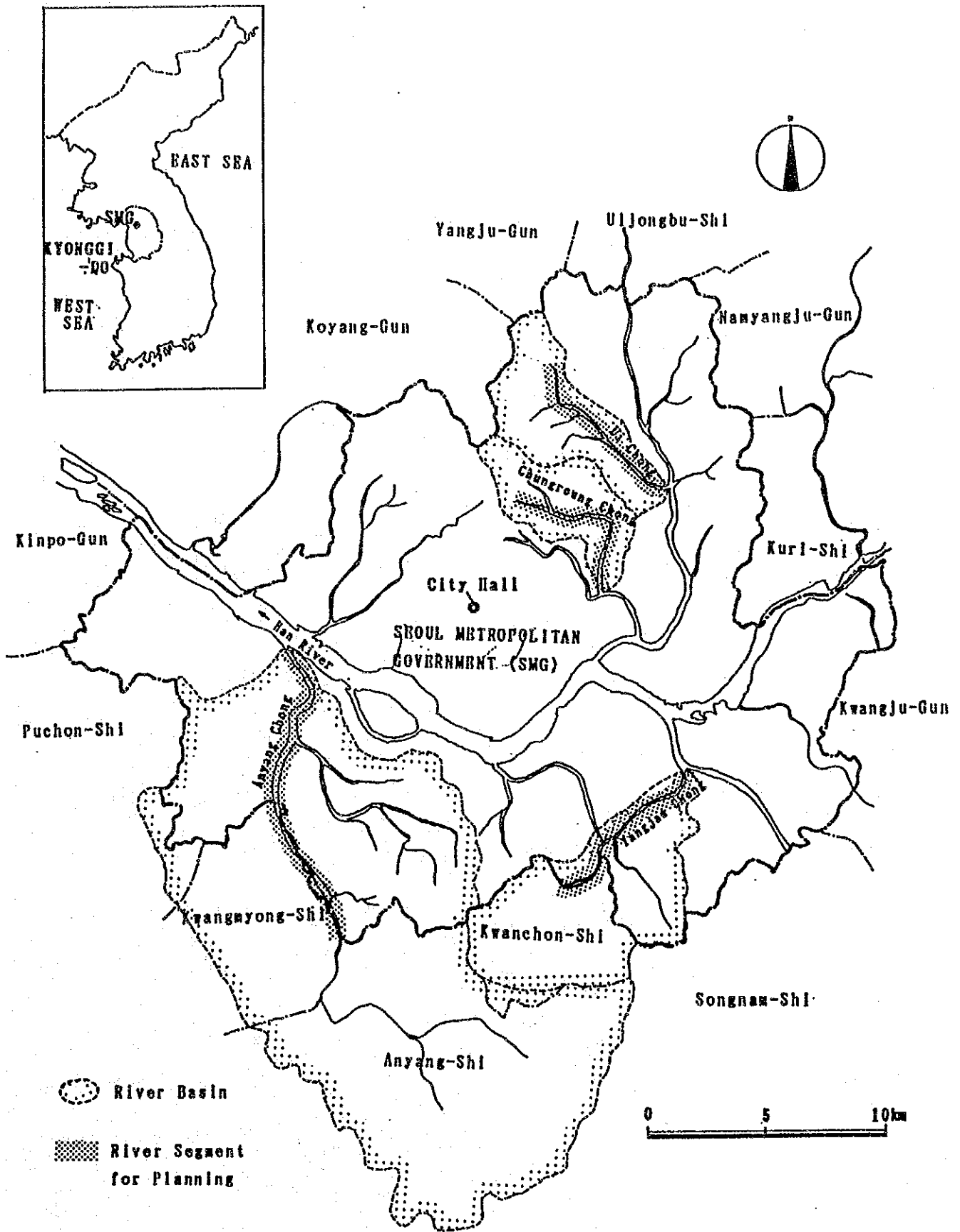


Fig. 1.2-1 Study Area



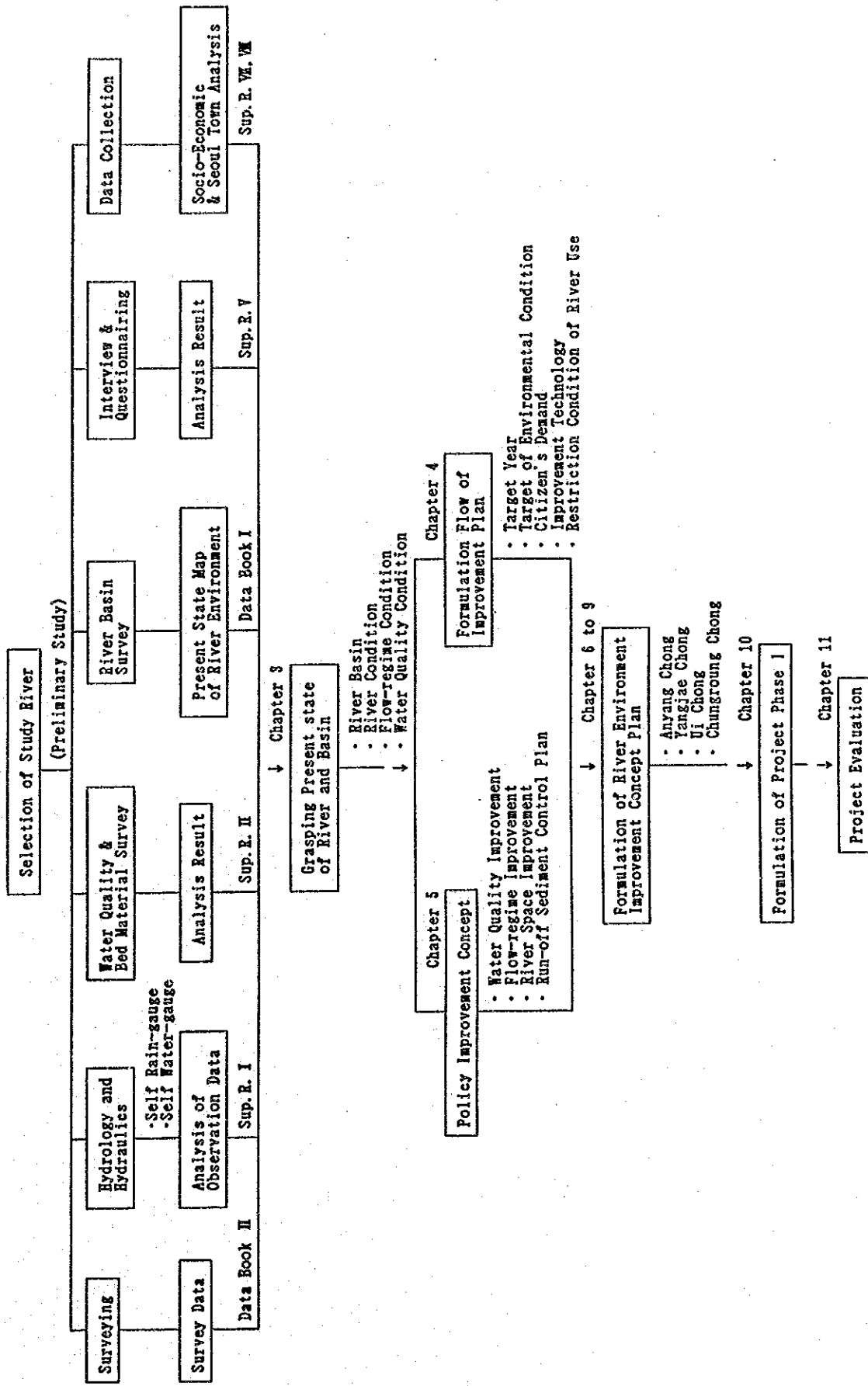


Fig. 1.3-1 Work Flow of the Study



## **Chapter 2. Present Condition of Seoul Metropolitan**

### **2.1 Natural Environment**

#### **Topography**

It has a total area of 605.43 km<sup>2</sup>. In the Metropolitan area, the Han River winds mainly from east to west where it is joined by its main tributaries Chungryang Chong from the north, and Tan Chong and Anyang Chong from the south.

Han River is bounded to the north by Pukansan, a steep mountain extending from north to south with the highest peak and an elevation of 836 meters, and to the south by the Kwanakusan and Chongyesan mountains with an elevation of 629m and 439m, respectively.

#### **Geology**

Cretaceous granite crops out widely in highly elevated areas such as the Pukansan and Kwanakusan mountains. The other areas consist of Archean gneiss and schists. Low land along the Han river and its tributaries are covered by consolidated alluvium composed mainly of sand and gravel.

#### **Climate**

The mean annual rainfall is approximately 1,270 mm, three quarters of which falls from June to September. The first study year, 1990, was an unusually rainy year producing an annual rainfall which is 1.5 to 1.8 times larger than that of the normal year.

The metropolitan area was especially heavily rained on for two days in June and September producing more than 100mm of the



average amount of daily rainfall. The monthly rainfall during these months were 4 and 5 times larger than their mean values, respectively.

Table 2.1-2 shows the monthly rainfall (areal rainfall) in each basin during the study period from January 1990 to July 1991.

Table 2.1-2 Rainfall in the Basins in the Study Period

Unit:mm

	Anyang	Ynagjae	Ui	Chungroung	Mean
Jan.	25.9	33.0	--	--	15.0
Feb.	49.7	54.0	79.4	72.1	10.7
Mar.	75.4	84.8	66.3	70.5	51.5
Apr.	81.8	95.4	99.4	96.9	19.9
May	109.5	118.0	92.0	95.3	68.5
Jun.	413.8	462.4	595.1	545.9	123.1
Jul.	374.0	357.3	516.9	470.9	351.0
Aug.	227.4	267.0	262.7	178.1	366.2
Sep.	553.0	544.0	536.0	635.4	101.0
Oct.	1.2	0.0	1.6	13.6	78.6
Nov.	39.2	5.6	32.3	24.9	50.8
Dec.	9.7	0.7	16.5	7.5	30.0
<b>Total</b>	<b>1960.6</b>	<b>2020.2</b>	<b>2298.2</b>	<b>2211.1</b>	<b>1266.3</b>
Jan.	10.0	2.7	5.3	1.9	15.0
Feb.	18.2	4.2	26.2	13.4	10.7
Mar.	37.0	1.6	33.9	31.7	51.5
Apr.	40.0	1.5	33.2	39.7	19.9
May	79.7	71.3	96.6	79.1	68.5
Jun.	54.9	33.9	59.5	44.5	123.1
Jul.	29.8	2.8	55.1	44.9	351.0
<b>Total</b>	<b>269.6</b>	<b>118.0</b>	<b>309.8</b>	<b>255.2</b>	<b>639.7</b>
<b>G-total</b>	<b>2230.2</b>	<b>2138.2</b>	<b>2608.0</b>	<b>2466.3</b>	<b>1906.0</b>

\* Rainfall was calculated by Thiessen Method.

\* Mean value is the record of Seoul Central Meteorological St..





## **Vegetation**

The forest area occupies only a quarter of the whole Seoul Metropolitan area and these are man made secondary forests. Willows, alders, acacias, liriodendra, gindoro, pines, maples, etc., can be found in the forests, and most of these trees are aestilignosa broad leaf trees.

## **2.2 Civic Life**

### **Road**

The traffic condition in the metropolitan has become a very serious problem lately, because the automobile registration rate for the past 5 years has increased to 250% (average annual rate:20%), while the average annual rate of the extension of urban roads is only about 1.7%.

### **Water Supply**

The diffusion rate of water supply in the Seoul Metropolitan area has reached 99.8% by the end of 1988. Water is taken from the main course of the Han River and the water reservoir of the Paltang dam and supplied at a rate of 415 liters/person/day.

### **Sewerage and Sewage Treatment Plant**

The sewerage construction work started again in 1954. The total length of the sewers installed by the end of 1990 is 8,810 km and the sewer system covers 95% of the planned drainage area.

At present, 4 of the sewage treatment plants constructed by the



Integrated Han River Development Project are being operated. Although their total treatment capacity amounts to  $3.06 \times 10^6$  m<sup>3</sup>/day, the amount does not meet the required demand which is  $3.81 \times 10^6$  m<sup>3</sup>/day as based on the daily average sewage flow in 1989.

In addition, intercepting sewers are also installed in the main rivers to connect the sewers with the treatment plants. By the end of 1990, the total length of the intercepting sewers has reached 299 km.

### **Park**

The park area per head in Seoul Metropolitan is 8.3 m<sup>2</sup>, and a considerable number of parks are natural parks to which no facilities have been installed. The total area per head of neighborhood parks, children's parks, amusement parks and cemeteries is not more than 2.7 m<sup>2</sup> (1988).

However, 8 of the "Dongs" (Korean word for "street") do not meet the official park installation standard (6 m<sup>2</sup>/head) required by the Facility Ordinance (Sec.3) of the City Planning Law, and 4 of the "Dongs" do not meet the official neighborhood park installation standard of 2 m<sup>2</sup>/head, since most of these parks are located in mountainous areas outside of the metropolitan area.

## **2.3 Influence of Urbanization in the River Environment**

### **Lowering of River Recharging Capacity by Varied Land Use**

It is considered that the run-off coefficient in the basins covering the tributaries in the study area has increased largely with the urbanization of the Seoul vicinity. Additionally, the installation of intercepting sewers in the Han River and its main



tributaries shall enable the immediate transport of rain water to the sewerage plant without recharging river basins.

#### **2.4 River Administration**

"River Law" is the basic law for river administration in the Republic of Korea. It classifies rivers into 3 categories namely, Class A, Class B, and Class C under the jurisdiction of the central, provincial, and local governments, respectively. This classification applies to every section not to every river systems.

Among the 35 rivers in Seoul Metropolitan, the Han River, Chungryang Chong and Anyang Chong are classified in Class A, and except for Chonggye Chong of Chungryang Chong which is classified in Class B, the other medium and small-scale rivers are classified in Class C and managed by the Flood Control Division of the Metropolitan Government.

Except for the 2 Class C rivers, the 35 rivers in Seoul Metropolitan had been improved nearly 100% by the end of 1989. In addition, the pump station improvement which is in accordance with the flood control project, shall be completed by the end of 1993. However, due to the large damage caused by the heavy flood in September 1990, the flood control project and the countermeasure program for flood damages are being reviewed.

#### **2.5 Environmental Administration**

The water quality environmental administration of ROK was conducted in accordance with the Environmental Protection Law (1977) before the modification of the Basic Environmental Policy Law and Water Quality Protection Law in 1990. Now, the administration is conducted in accordance with these modified Laws.



The water quality standards of rivers are classified into five levels, from Class I to Class V, depending upon the utilization of water in these areas. Moreover, the acceptable water quality standard values of waste water being discharged in public water areas are determined from the classification of the water areas.

Regarding the protection of the water area environment in the metropolitan, Seoul Regional Environmental Office monitors water quality in public water areas and the waste of industrial area, production factories which discharge specific harmful water quality materials (belong for photographic, typographic industry). Environmental Protection Division (belong to Environmental Bureau) controls the waste except them. But Seoul City Hall monitor and guard industrial area from 1990, production factories of specific harmful water quality materials from the second half of 1990.

## **2.6 Public Finance and Projects Related to Environmental Improvement**

The budget of the Seoul Metropolitan Government comprises of general and special funds. The former is obtained from local taxes and other incomes and are used to subsidize wards and various public property services. The latter is obtained from specific incomes, such as charges for beneficiaries, etc., and are used to cover the expenses of 15 kinds of public works, such as urban development, water supply and drainage, subway, hospitals, etc. The total budget of the Seoul Metropolitan Government in the fiscal year 1990 was 29.6% higher than the 1989 budget at 4,612 billion won.

There were several river environment improvement projects which were studied under the mid-term plan for flood control projects, however, none of these have been executed. The river improvement and management budget which is included in the area development cost has been decreasing every year arriving at 445 billion won





in the fiscal year 1991, an amount 16% less than that of the preceding year.

The budget for river environment improvement projects such as river improvement, drainage pump station improvement, and Han River Civil Park improvement, etc., is included in the area development budget. On the other hand, the budget for the improvement of the environment and green tract and parks which is included in the social welfare budget, is increasing yearly and has reached 164 billion won in the fiscal year 1990.

Some of the projects executed by the construction and Engineering Office were also financed by the area development cost, although they contain work related to environmental improvement.

The sewerage works are specially financed, and the budget allocated for sewerage works in the fiscal year 1990 was 100.6 billion won. This amount corresponds to 2.3% of the total budget, but is less than the 1989 budget.

